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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DONALD R. PEDERSON and JAMES B. CHAPMAN

Appeal 2008-2945
Application 09/784,392
Technology Center 2100

Decided:[1] February 20, 2009

Before JOSEPH L. DIXON, HOWARD B. BLANKENSHIP, and STEPHEN C. SIU, *Administrative Patent Judges*.

DIXON, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

I. STATEMENT OF THE CASE

A Patent Examiner rejected claims 1-43. The Appellants appeal therefrom under 35 U.S.C. § 134(a). We have jurisdiction under 35 U.S.C. § 6(b).

A. INVENTION

The invention at issue on appeal relates to database management and, more particularly, to optimization of end transaction processing. (Spec. 1.) In general, a method of performing a transaction in a database system comprises receiving a transaction to be performed, wherein the transaction is processed by a plurality of access modules. A flush of a transaction log is performed in each access module before an end transaction procedure. (Spec. 3.) Additionally, the Specification states:

> In one embodiment, the end transaction involves further processing, such as for performing delayed action work or other operations not pertinent here. Just to get the transaction committed, however, as illustrated in Figure 5, the end transaction processing involved a broadcast, a flush of the transaction log 25, and a "last done" coordination between the access modules 20.
>
> In terms of bandwidth requirements and elapsed time, the broadcasts and "last done" coordination operations are expensive. Depending on the number of access modules 20 involved in the transaction 34, the broadcast and "last done" coordination operations may include as few as a couple of messages or as many as thousands of messages.
>
> The flushes from memory cache to storage 30 may be costly as well. Since access times for non-volatile media such as hard disk drives are generally much slower than memory cache accesses, one

optimization that may improve performance of the RDBMS is to decrease the number of writes to stable storage 30.

(Spec. 11, ll. 4-18).

B. Illustrative Claims

Claims 1 and 10, which further illustrate the invention, follow.

1. A computer implemented method of performing a transaction in a database system, comprising:

receiving a transaction to be performed, wherein the transaction is processed by a plurality of access modules; and

before any directive indicating commencement of an end transaction procedure is broadcast to the access modules, performing a flush of a transaction log from volatile storage to non-volatile storage by each of the access modules.

10. A computer implemented method of performing an end transaction procedure in a database system, comprising:

after commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion in volatile storage, the first access module being part of a cluster of access modules; and

the first access module sending an end transaction directive to a fallback access module associated with the first access module, the fallback access module being part of the cluster.

C. References

The Examiner relies on the following references as evidence:

Tada	US 5,544,359	Aug. 6, 1996
Debrunner	US 6,321,234 B1	Nov. 20, 2001 (filed Nov. 8, 1996)

Gray, J. and Reuter, A., *Transaction Processing: Concepts and Techniques*, Morgan-Kaufman, CA. (1993).

D. REJECTIONS

The Examiner makes the following rejections.

Claims 1-9, 17-31, 34-35, and 38-41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tada in view of Debrunner.

Claims 10-16 and 42-43[2] stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tada in view of Gray.

Claims 32-33 and 36-37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tada in view of Debrunner and further in view of Gray.

II. ISSUE

Has the Examiner set forth a sufficient initial showing of obviousness of the claimed invention?

III. PRINCIPLES OF LAW

35 U.S.C. § 103(a)

> Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1734 (2007).

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[2] We note that dependent claims 42 and 43 are rejected over the combination of Tada in view of Gray, but parent claims 40 and 21 are rejected over Tada in view of Debrunner. We will treat these claims as rejected over the combination of all three references as in the third stated rejection by the Examiner.

In *KSR*, the Supreme Court emphasized "the need for caution in granting a patent based on the combination of elements found in the prior art," *Id.* at 1739, and discussed circumstances in which a patent might be determined to be obvious. *KSR,* 127 S. Ct. at 1739 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 12 (1966)). The Court reaffirmed principles based on its precedent that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* The operative question in this "functional approach" is thus "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 1740.

The Federal Circuit recently recognized that "[a]n obviousness determination is not the result of a rigid formula disassociated from the consideration of the facts of a case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not." *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007) (citing *KSR*, 127 S. Ct. 1727, 1739 (2007)). The Federal Circuit relied in part on the fact that Leapfrog had presented no evidence that the inclusion of a reader in the combined device was "uniquely challenging or difficult for one of ordinary skill in the art" or "represented an unobvious step over the prior art." *Id.* at 1162 (citing *KSR*, 127 S. Ct. at 1740-41).

One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

IV. FINDINGS OF FACT

Appellants' Specification explains and defines the end transaction processing and "committed" at pages 9-11 as published in Published Patent Application 20020112094 as follows:.

> [0052] End Transaction Processing
>
> [0053] End transaction processing ensures that, where a hardware failure disrupts a transaction, the transaction 34 nevertheless may be either reimplemented or rolled back in its entirety. For many RDBMSs, end transaction processing involves multiple phases. Under Teradata, for example, the transaction 34 is not committed until the entire transaction log 25 associated with a transaction 34 is flushed to stable storage 30. In other words, every log 25 for every one of the access modules 20 involved in the transaction 34 is flushed before the transaction 34 is considered committed.
>
> [0054] Once flushed, an END TRANSACTION entry may be made in the transaction log 25. In one embodiment, the RDBMS 100 may re-implement the transaction 34 in its entirety even if only one log 25 from one access module 20 includes the END TRANSACTION entry.
>
> [0055] The commitment of a transaction 34 during end transaction processing is depicted in the flow diagram of FIG. 5, according to one embodiment. The end transaction processing may commence automatically, in the case of an implicit transaction, or after receiving notification from the client 44 that the transaction is ended, e.g., an explicit transaction. The parsing engine 10 broadcasts an END TRANSACTION directive to all access modules 20 involved in the transaction 34 (block 202). Each access module 20 flushes its transaction log 25 (block 204). Because the access modules 20 are distributed, a "last done" coordination between the access modules 20 is performed, according to one embodiment (block 206).
>
> [0056] "Last done" coordination ensures that all access modules 20 have completed the step 38, in this case, a log flush, before continuing to a next step 38 of the transaction 34. Essentially, "last done" coordination is a handshaking operation between the parsing engine

10 and the access modules 20 whenever the step 38 involves multiple access modules 20. In this example, the transaction 34 may not be committed until all transaction logs 25 have been flushed.

[0057] The "last done" coordination safeguards against premature commitment of the transaction 34. "Last done" coordination may be performed whenever multiple access modules 20 together perform a single step 38, not just during end transaction processing.

[0058] The last access module 20 to flush its transaction log 25 informs the other access modules 20, and the parsing engine 10, that the flush operation, for the entire transaction 34, is complete (block 208). The access modules 20 record the END TRANSACTION directive to their respective transaction logs 25 (block 210). The transaction 34 is now committed (block 212).

[0059] In one embodiment, the end transaction involves further processing, such as for performing delayed action work or other operations not pertinent here. Just to get the transaction committed, however, as illustrated in FIG. 5, the end transaction processing involved a broadcast, a flush of the transaction log 25, and a "last done" coordination between the access modules 20.

[0060] In terms of bandwidth requirements and elapsed time, the broadcasts and "last done" coordination operations are expensive. Depending on the number of access modules 20 involved in the transaction 34, the broadcast and "last done" coordination operations may include as few as a couple of messages or as many as thousands of messages.

[0061] The flushes from memory cache to storage 30 may be costly as well. Since access times for non-volatile media such as hard disk drives are generally much slower than memory cache accesses, one optimization that may improve performance of the RDBMS is to decrease the number of writes to stable storage 30.

V. ANALYSIS

With respect to independent claim 1, Appellants argue that the independent claims are directed to performing a flush of a transaction log from volatile storage and non-volatile storage before any directive indicating commencement of an end transaction procedure is broadcast to plural access modules. (App. Br. 6). Appellants argue that the Examiner does not rely upon Tada to perform a flush of the transaction log from volatile to nonvolatile storage by the access module but the Examiner admits that Tada does not teach "before any directive indicating commencement of an end transaction procedure is broadcast to the access module." Therefore, the Examiner relies upon the teachings of Debrunner to teach "before any directive indicating commencement of an end transaction procedure is broadcast to the access module." (App. Br. 6). Appellants maintain that the claimed invention "as a whole" must be considered in the evaluation of the prior art and prevents the Examiner from a part by part evaluation of the claimed invention. Here, Appellants maintain that the Examiner has dissected the claim language at issue and has found discrete parts and combined those parts without respect to the sequence of the parts and what must occur before such a broadcast. Appellants maintain that what is relevant in the claimed invention is that a flush of a transaction log from volatile storage to non-volatile storage occurs before any directive indicating commencement of an end transaction procedure is broadcast to plural access modules. Appellants maintain that neither Tada nor Debrunner alone or in combination teaches or suggests such a claimed invention.

We agree with Appellants that the Examiner's reliance upon column 9 of Debrunner is not well founded since that portion of Debrunner discusses

the flushing of the private log cache to the actual transaction log whereby the log records tend to be much more grouped together as they are flushed as a group from the private log cache of a task to the actual transaction log. (Debrunner col. 9, ll. 18-33). Therefore, we find the Examiner's reliance on the teachings of Debrunner to be taken out of context since the private cache memory log would be a storage from a volatile storage to another volatile storage and ultimately to a non-volatile storage after an end transaction procedure. Claim terms are not interpreted in a vacuum, devoid of the context of the claim as a whole. *See Hockerson-Halberstadt, Inc. v. Converse Inc.,* 183 F.3d 1369, 1374 (Fed. Cir. 1999) ("Proper claim construction ... demands interpretation of the entire claim in context, not a single element in isolation."); *ACTV, Inc. v. Walt Disney Co.,* 346 F.3d 1082, 1088 (Fed. Cir. 2003) ("While certain terms may be at the center of the claim construction debate, the context of the surrounding words of the claim also must be considered....").

We further find the Examiner's stated rejection to lack sufficient clarity to establish a prima facie showing of obviousness of the claimed invention. Initially, at pages 16-17 of the Answer, the Examiner seems to state that Tada teaches performing a flush of a transaction log from volatile storage to non-volatile storage by an access module as the content of the HLF buffer (114a) for the HLF-1 is transferred to the HLF buffer (112a) on the non-volatile mass memory (103) for the HLF-1 during the first loop and that the flush operation S10 is preformed before the end transaction procedure S14.

Subsequently, the Examiner states that Tada does not explicitly disclose "before any directive indicating commencement of an end

transaction procedure is broadcast to the access modules" and then the Examiner relies on the teachings of Debrunner. The Examiner then uses this sole quotation from Debrunner to teach and suggest performing the flush before the end transaction procedure. Additionally, the Examiner's motivation to combine the teachings is to reduce contention for the log semaphore and increase transaction throughput of the database server system with storing the individual transactions in the private transaction log. But this does not relate to the flushing of the transaction log before the end transaction procedure. Hence, it is unclear how the Examiner is applying the prior art to the claimed invention.

Here, we agree with Appellants' arguments as advanced at pages 7-8 of the Brief discussing the above teachings of Debrunner. Therefore, we find that the Examiner has not set forth a sufficient initial showing of obviousness of the invention as recited in independent claim 1.

Moreover, we find the weight of the evidence generally supports Appellants' contention that the Examiner has taken disparate bits and pieces of subject matter from the references and combined these elements in an attempt to reconstruct Appellants' claimed invention. The U.S. Supreme Court has reaffirmed that "[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of argument reliant upon *ex post* reasoning." *KSR*, 127 S. Ct. at 1742. *See also Graham v. John Deere Co.*, 383 U.S. 1, 36 (1966). Nevertheless, in *KSR* the Supreme Court also qualified the issue of hindsight by stating that "[r]igid preventative rules that deny factfinders recourse to common sense, however, are neither necessary under our case law nor consistent with it." *KSR*, 127 S. Ct. at 1742-43.

Here, we agree with Appellants that a person of ordinary skill in the art at the time of the invention would not have reasonably combined the references in the manner suggested by the Examiner. Therefore, we cannot sustain the rejection of independent claim 1 and its dependent claims. Similarly, independent claims 17, 21, 24, and 28 contain similar limitations to independent claim 1, and we can not sustain the rejection of claims 17, 21, 24, and 28 and their respective dependent claims.

With respect to independent claim 10, Appellants claim the invention from a different point of view. Appellants claim "performing an end transaction procedure in a database system, comprising: after commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion ***in volatile storage***...." (App. Br. 8-9). Appellants contend that the Examiner has mis-applied the teachings of Tada with respect to independent claim 10. Appellants further contend that Tada teaches storage of the indication of completion of the transaction is stored in the non-volatile mass memory 103 rather than in a first transaction log portion in volatile storage as recited in independent claim 10. The Examiner relies upon column 9 of Tada to teach recordation of end transaction indication (Ans. 17-19). Here, we disagree with the Examiner and agree with Appellants' analysis (Reply Br. 9) that the transaction file 115 of Tada is in non-volatile mass memory rather than in volatile memory as maintained by the Examiner. Therefore, we find that Appellant has shown error in the Examiner's initial showing. Furthermore, the Examiner has not shown how the teachings of Gray remedy the above noted deficiencies. Therefore, we find that Appellant has shown error in the

Examiner's initial showing and Examiner has not set forth sufficient initial showing of obviousness of independent claim 10 and its dependent claims.

VI. CONCLUSION

For the aforementioned reasons, we conclude that the Examiner has not set forth a sufficient initial showing of obviousness.

VII. ORDER

We reverse the obviousness rejections of claims 1-43.

REVERSED

rwk

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